Curriculum Planning Document – Science

Content Area/Grade Level: Science/Grade 8

Course Description:

Life Science: This two-semester course for middle-school students offers a broad experience in the biological sciences. Beginning with life on a small scale through an introduction to cells, students are introduced to structures and functions of cells, cell theory, cell reproduction and genetics. A brief unit on evolution gives students some background on Darwin's theory and evidence of the past. The classification and organization of living organisms and the characteristics of the variety of plant and animal groups is also addressed. An in-depth unit of human biology is included to emphasize the organ systems and their functions in maintaining a healthy life. The course also includes a study of ecology and the interrelationships that help to maintain life on earth.

Earth Science: This two-semester course covers many aspects of Earth science, including an overview of the Earth's structure, rocks, minerals, and resources. A major unit on the forces that change the Earth includes lessons on plate tectonics, earthquakes, volcanoes, and erosion, concluding in a section that discusses Earth's history of change through the fossil record. A general study of oceanography explores such concepts as the sources of water, currents and climate, and the structure of the ocean environment. Atmospheric science with lessons in weather and climate are also included. A unit on space science exposes students to the interactions of the earth, moon, and sun and an overview of our solar system and the universe beyond.

	Educational Delivery Methodologies	Evidence of Mastery	Comments
Strand 1: Inquiry Process			
Concept 1: Observations, Questions, and Hypotheses	• Online video lecture • Online content links to articles describing the steps of the scientific method • Simulated lab to analyze mystery powder using its properties	• Journal activity • Lab assessment • Homework/ Practice • Quiz	Life Science Earth Science
Concept 2: Scientific Testing (Investigating and Modeling)	• Online video lecture • Online content links to articles describing the scientific method and organization/analysis of data • Simulated lab to analyze mystery powder using its properties	• Journal activity • Lab assessment • Homework/ Practice • Quiz	Life Science Earth Science

Concept 3: Analysis and Conclusions	• Online video lecture • Online content links to articles describing the scientific method and organization/analysis of data	• Journal activity • Homework/ Practice • Quiz	Life Science
Concept 4: Communication	• Online video lecture • Online content links to articles describing the scientific method and organization/analysis of data • Simulated lab to practice reading topographical maps	• Journal activity • Lab assessment • Homework/ Practice • Quiz	Life Science Earth Science
Strand 2: History and Nature of Science			
Concept 1: History of Science as a Human Endeavor	• Online video lectures • Online content about scientific inquiry and scientific careers	• Journal activity • Homework/ Practice • Quiz	Life Science Earth Science
Concept 2: Nature of Scientific Knowledge	• Online video lectures • Audio vocabulary and definitions • Online content and journal activity about scientific inquiry; scientific theory vs. law	• Journal activity • Homework/ Practice • Quiz • Test	Life Science Earth Science
Strand 3: Science in Personal and Social Perspectives			
Concept 1: Changes in Environments	• Online video lectures • Online content about genetically modified foods; Kyoto Protocol; global warming and its effects • Simulated lab about water cycle; toxic pollutants	• Journal activity • Lab assessment • Homework/ Practice • Quiz • Test	Life Science Physical Science

Concept 2: Science and Technology in Society	• Online video lectures • Online content about genetically modified foods and the use of technology in research	• Journal activity • Homework/ Practice • Quiz	Life Science
Strand 4: Life Science			
Concept 1: Structure and Function in Living Systems	• Online video lectures • Audio vocabulary and definitions • Simulated labs on photosynthesis in plants; cell structure in plant and animal cells; cell division and reproduction; human systems • Online content articles about cell structure and function; human systems	• Journal activity • Lab assessment • Homework/ Practice • Quizzes • Tests	Life Science
Concept 2: Reproduction and Heredity	• Online video lectures • Audio vocabulary and definitions • Simulated labs about DNA/RNA, meiosis, breeding chickens with known genotypes, breeding mice to monitor dominant traits, karyotyping • Online content articles about human reproduction; genetic disorders	• Journal activity • Lab assessment • Homework/ Practice • Quizzes • Tests	Life Science

Concept 3: Populations of Organisms in an Ecosystem	• Online video lectures • Online content articles about land biomes, freshwater ecosystems, marine ecosystems, forests and fisheries • Simulated lab about the effect of weather on rabbit population	• Journal activity • Lab assessment • Homework/ Practice • Quizzes • Test	Life Science
Concept 4: Diversity, Adaptation, and Behavior	• Online video lectures • Audio vocabulary and definitions • Simulated labs about effect of predators on biodiversity; natural selection; adaptation of a bird's beak based on increased rain fall over five years • Online content articles about biodiversity and evolutionary theory	• Journal activity • Lab assessments • Homework/ Practice • Quizzes • Test	Life Science
Strand 5: Physical Science			
Concept 1: Properties and Changes of Properties in Matter	• Online video lectures • Audio vocabulary and definitions • Simulated labs about molecular chemistry	• Journal activity • Lab assessment • Homework/ Practice • Quiz • Test	Covered in 9th grade Physical Science
Concept 2: Motion and Forces	• Online video lectures • Simulated labs • Online content articles about motion, momentum, acceleration, Newton's laws, pressure • Model using formulas to solve problems	• Journal activity • Lab assessment • Homework/ Practice • Quiz • Test	Covered in 9th grade Physical Science

Concept 3: Transfer of Energy	• Online video lectures • Simulated labs: torque, moment of inertia; energy of a pendulum; heat • Practice problems about work • Model using formulas to solve problems	• Journal activity • Lab assessment • Homework/ Practice • Quiz • Test	Covered in 9th grade Physical Science
Strand 6: Earth and Space Science			
Concept 1: Structure of the Earth	• Online video lectures • Audio vocabulary and definitions • Online content article about earth's layers	• Journal activity • Homework/ Practice • Quiz	Earth Science
Concept 2: Earth's Processes and Systems	• Online video lectures • Online content articles about Earth's processes and systems, including plate tectonics and its link to earthquakes; volcanic activity; its waters, erosion, and the atmosphere	• Journal activity • Homework/ • Practice • Quiz • Test	Earth Science
Concept 3: Earth in the Solar System	• Online video lectures • Audio vocabulary and definitions • Simulated lab about Earth's seasons , moonrise and moonset, orbit simulator, and eclipses • Online content articles about the Earth in the solar system, including the inner and outer planets, stars and galaxies	• Journal activity • Lab assessment • Homework/ Practice • Quiz • Test • Cumulative Exam	Earth Science

Curriculum Planning Document – Science

Content Area/Grade Level: Science/High School

Course Description:

Physical Science: This two-semester course provides students with a thorough introduction of chemistry, physics, and astronomy. Chemistry concepts include the structure and properties of matter, the periodic table, chemical bonds, and reactions, as well as acids, bases, and solutions. An overview of motion, forces, and energy is the focus of the physics section of the course. Newton's laws of motion, work, machines, and energy are the major ideas explored. An introduction to Earth and its place in the universe completes the course.

Biology: This two-semester high school course covers an in-depth view of biological science concepts. A brief section of biochemistry leads into an overview of ecology and the interactions of the environment and populations of living organisms. A comprehensive section on cellular biology and genetics exposes students to biology on a small scale that leads to the theory of evolution and the history of life on Earth. The remainder of the course explores the complexity and variety of life on Earth with sections devoted to simple organisms, plants, invertebrates, and vertebrates, as well as human biology.

Chemistry: This two-semester high school course covers the foundation for the composition, structure, and reactions of matter. It addresses scientific measurements, the general properties of matter, and the structure of the atoms. Also covered are the periodic table, types of bonds, and chemical equations. Other topics involve introducing the states of matter, chemical reactions, and the energy involved in chemical changes. Sections on organic chemistry are also included, as well as a brief overview of nuclear chemistry. This course requires students to have a solid foundation in math as calculations and conversions are basic components of chemistry.

Physics: This upper division, two-semester high school course provides the foundation for the laws that govern the concepts of motion and energy. This course relies on the use of mathematics to represent and illustrate different phenomena, so students need to have a strong math background to be successful. Major themes on this course include mechanics, states of matter, waves and light, energy and magnetism, and modern physics.

Environmental Science: This two-semester course encompasses six major units which cover many aspects of environmental science: Ecology; The Biosphere; The Land, Forests, and Soil; The Water; Energy and Resources; and Societies and Policy. The course utilizes a two or three section lecture format to provide opportunities for mastery learning in smaller segments. Environmental Science contains Global Connections lessons which include unique activities that merge lesson material with real world issues pertaining to the environment. This course contains activities such as vocabulary, online content, journals, practice and homework, and skills lessons. Assessment questions in the form of a quiz follow each lesson and a summative exam follows each topic. A cumulative exam concludes the end of each semester.

	Educational Delivery Methodologies	Evidence of Mastery	Comments
Strand 1: Inquiry Process			

Concept 1: Observations, Questions, and Hypotheses	• Online video lectures • Audio vocabulary and definitions • Online content articles about the scientific inquiry process	• Journal activity • Homework/ Practice • Quiz • Test	Physical Science Environmental Science
Concept 2: Scientific Testing (Investigating and Modeling)	• Online video lectures • Simulated labs with models that explore experimental design, tools and procedures; Newton's laws; using physical properties of substances to determine their identity • Model measurement conversions and different representations of data, i.e., graphs, models, drawings, grids	• Journal activity • Lab assessment • Homework/ Practice • Quizzes • Test	Physical Science Biology Chemistry Physics Environmental Science
Concept 3: Analysis, Conclusions, and Refinements	• Online video lectures • Simulated labs on models, experimental design • Online content articles that evaluate scientific claims, scientific design	• Journal activity • Lab assessment • Homework/ Practice • Quizzes • Test	Physical Science Biology
Concept 4: Communication	• Online video lectures • Online content articles about technology and representing data	• Journal activity • Homework/ Practice • Quiz • Test	Physical Science
Strand 2: History and Nature of Science			

Concept 1: History of Science as a Human Endeavor	• Online video lectures • Audio vocabulary and definitions • Online content articles about the role of scientists in developing scientific theory and making contributions to the world	• Journal activity • Homework/ Practice • Quiz	Physical Science Biology
Concept 2: Nature of Scientific Knowledge	• Online video lectures • Online content articles about scientific theory • Simulated labs about experimental setup, models	• Journal activity • Homework/Practice • Quiz	Physical Science Biology
Strand 3: Science in Personal and Social Perspectives			
Concept 1: Changes in Environments	• Online video lectures • Audio vocabulary and definitions • Online content articles about threats to biodiversity; climate change; ecology • Simulated labs about ecology	• Journal activity • Lab assessments • Homework/ Practice • Quiz • Test	Biology Environmental Science
Concept 2: Science and Technology in Society	• Online video lectures • Online content about scientific advancements in society, i.e., the Human Genome, use of technology in experimental design	• Journal activity • Homework/ Practice • Quiz	Physical Science Biology Environmental Science
Strand 4: Life Science			

Concept 1: The Cell	• Online video lectures • Audio vocabulary and definitions • Online content articles about cellular biology • Simulated labs about cellular biology • Use diagrams to explain cell structure and reproduction/process es	• Journal activity • Lab assessment • Homework/ Practice • Quiz • Test	Biology
Concept 2: Molecular Basis of Heredity	• Online video lectures • Audio vocabulary and definitions • Online content about Mendelian and modern genetics, including gene technology and the Human Genome • Simulated labs about genetics (Punnett squares) and heredity • Model Punnett squares and phases of meiosis	• Journal activity • Lab assessments • Homework/ Practice • Quiz • Test	Biology
Concept 3: Interdependence of Organisms	• Online video lectures • Audio vocabulary and definitions • Online content articles about biodiversity, evolution, and ecosystems • Simulated labs including the food chain, water pollution, environmental effects on biodiversity, ecology	• Journal activity • Lab assessments • Homework/ Practice • Quiz • Test	Biology Environmental Science

Concept 4: Biological Evolution	• Online video lectures • Audio vocabulary and definitions • Online content articles about evolution, particularly mammalian, including Darwinian evolution and species classification (Linnaeus) • Simulated labs about evolution and its trends	• Journal activity • Lab assessments • Homework/ Practice • Quiz • Test	Biology
Concept 5: Matter, Energy, and Organization in Living Systems (Including Human Systems)	• Online video lectures • Audio vocabulary and definitions • Online content about the nature of matter, biochemistry, each system of the human body • Simulated labs about the nature of matter, biochemistry, human body systems • Use diagrams to learn body systems	• Journal activity • Lab assessments • Homework/ Practice • Quiz • Test	Biology Chemistry
Concept 2: Motion and Forces	• Online video lectures • Simulated labs about types of motion and work • Model formulas	• Journal activity • Lab assessments • Homework/ Practice	Physical Science Physics
Concept 3: Transfer of Energy	• Online video lectures • Simulated labs about work, energy, and laws of conservation • Model formulas	• Journal activity • Lab assessments • Homework/ Practice • Quiz	Physics
Strand 5: Physical Science			

Concept 1: Structure and Properties of Matter	• Online video lectures • Audio vocabulary and definitions • Simulated labs about molecular chemistry	• Journal activity • Lab assessment • Homework/ Practice • Quiz • Test	Physical Science Chemistry
Concept 2: Motions and Forces	• Online video lectures • Simulated labs about Newton's laws, relationship of force and motion; circular motion; mechanics • Model use of formulas	• Journal activity • Lab assessments • Homework/ Practice • Quiz • Test	Physics
Concept 3: Conservation of Energy and Increase in Disorder	• Online video lectures • Online content about Newton's laws • Simulated labs about Newton's laws	• Journal activity • Lab assessments • Homework/ Practice • Quiz • Test	Physics
Concept 4: Chemical Reactions	• Online video lectures • Audio vocabulary and definitions • Online content articles about molecular chemistry; effect of enzymes on chemical reactions • Model balancing equations	• Journal activity • Lab assessment • Homework/ Practice • Quiz • Test	Physical Science Biology Chemistry
Concept 5: Interactions of Energy and Matter	• Online video lectures • Online content on states of matter and intermolecular forces, energy in chemical changes, energy used to do work • Simulated labs	• Journal activity • Lab assessment • Homework/ Practice • Quiz • Test	Chemistry Physics
Strand 6: Earth and Space Science			

Concept 1: Geochemical Cycles	• Online video lectures • Audio vocabulary and definitions • Online content articles about rock formation and other geochemical processes that shape and form the earth	• Journal activity • Lab assessment • Homework/ Practice • Quiz • Test	Physical Science
Concept 2: Energy in the Earth System (Both Internal and External)	• Online video lectures • Audio vocabulary and definitions • Online content articles on energy transfer, photosynthesis, deep sea ecologies, human impact on the environment, earthquakes and volcanoes • Simulated labs about the interior and exterior of the earth	• Journal activity • Lab assessments • Homework/ Practice • Quiz • Test	Environmental Science
Concept 3: Origin and Evolution of the Earth System	• Online video lectures • Audio vocabulary and definitions • Online content articles on systems of Earth's biosphere, patterns in the system, water cycle, ecosystems	• Journal activity • Lab assessments • Homework/ Practice • Quiz • Test	Environmental Science Physical Science
Concept 4: Origin and Evolution of the Universe	• Online video lectures • Audio vocabulary and definitions • Online content articles about the origin of the universe, the Milky Way galaxy, the interior and exterior planets • Simulated labs about the Universe's origins	• Journal activity • Lab assessments • Homework/ Practice • Quiz • Test	Physical Science